

REMARKS

In response to the Office Action mailed October 17, 2003, Applicants amend their application and request reconsideration. No claims are added or cancelled so that claims 14-17 remain pending.

There is no amendment in response to the Office Action. Rather, the amendments made to claims 13, 17, and 18 correct inadvertent errors in the preparation of the Preliminary Amendment. Omissions in claims 14 and 18 are corrected and claim 17 is conformed to the language of claim 15. As recognized by the Examiner, all of the limitations of claim 15 appear in claim 17. In addition, an obvious typographical error in claim 18 is corrected. None of these amendments are made in response to the Office Action, but rather correct errors made in the preparation of the Preliminary Amendment.

All claims were rejected for obviousness-type double patenting over the parent patent application which matured into U.S. Patent 6,273,957. Upon the identification of allowable subject matter in this patent application, a Terminal Disclaimer will be supplied, overcoming the double patenting rejection.

Claim 14, an independent claim, and claims 16 and 18, dependent claims respectively depending from claims 15 and 17, were rejected as unpatentable over Li et al. (U.S. Patent 5,835,677, hereinafter Li) and in view of Zhao et al. (U.S. Patent 6,210,485, hereinafter Zhao) and further in view of Onabe (JP 9-143738). This rejection is respectfully traversed.

Turning to the third reference applied, Onabe, Applicants agree that Onabe describes a coaxial nozzle that may be considered similar to the coaxial nozzle described in dependent claims 16 and 18 and the final lines of claim 14. Therefore, there is no further comment with respect to the Onabe reference.

The invention is directed to a vaporizing device and a chemical vapor deposition apparatus incorporating the vaporizing device. An important objective of the vaporizing device is to spray from a nozzle CVD source materials, so that the spray is injected into a chamber. It is important that in the course of transporting the CVD source materials to the nozzle, that the source materials be cooled to avoid a chemical reaction driven by heat and to avoid undesired attachment of the materials to the walls of the conduit transporting the source materials. It is also important to heat the CVD source materials as they are vaporized and injected into the chamber. Thus, there are competing interests of cooling and heating of the flow of CVD source materials. Li and Zhao both recognized the same

desired goals as the invention, but sought to achieve those goals with a mechanical apparatus that is different from the claimed invention.

Among the important features of the claimed apparatus is that the spray nozzle has an end that is fixedly attached to the inlet of the chamber and a heat conduction restriction means between the chamber and the end of the spray nozzle. The heat restriction means forms an airtight seal between the spray nozzle and the chamber. Li and Zhao, individually lack that feature and no suggestion is found within those references for their combination in a way that would produce the claimed invention.

Turning first to the structure described by Li and cited by the Examiner, shown in Figure 2 of that patent, the vaporizer includes an ultrasonic nozzle 24. The open end of the ultrasonic nozzle seems to be held in place by an unnumbered element, presumably a porous disk. It is presumed that this disk is porous because Li describes, at column 8, lines 17-22 and column 9, lines 15-21, that a curtain of an inert gas, inlet through a port 28, flows alongside the walls in the volume intermediate the nozzle and the porous heated diffusers 52, 54, and 56. That volume is generally indicated by reference number 6. It is not apparent whether the expansion chamber 34 actually has the shape of a frustum since the curtain of gas flows along the outside walls. In any event, it is apparent that the unnumbered element holding the end of the nozzle 24 is not airtight so that that element cannot correspond to the heat conduction restriction means of the vaporizing device of claim 14.

Zhao, likewise, lacks any element corresponding to the heat conduction restricting means of the invention that forms an airtight seal between the spray nozzle and the chamber. There is no suggestion that, for example, the bushing 138 shown in Figure 4 of Zhao could correspond to that heat conduction restricting means. That bushing provides a direct connection between the injection member 114 and the remainder of the apparatus but is remote from the nozzle 144. Clearly, the nozzle 144 of Zhao lacks an airtight seal with respect to the conical chamber because the conduit 135 introducing the carrier gas into the recess 137 presents such a seal, even if the bushing 138 is moved closer to the nozzle 144.

Because both Li and Zhao lack the same important element of the vaporizing device as defined by claim 14, the combination of Li and Zhao cannot establish *prima facie* obviousness of that claim.

As noted, claims 15 and 17 are similar. In the structures described in claims 15 and 17, the vaporizing device includes, among other elements, a cooling block *in contact with* and surrounding the spray nozzle. Obviously, direct contact between the cooling

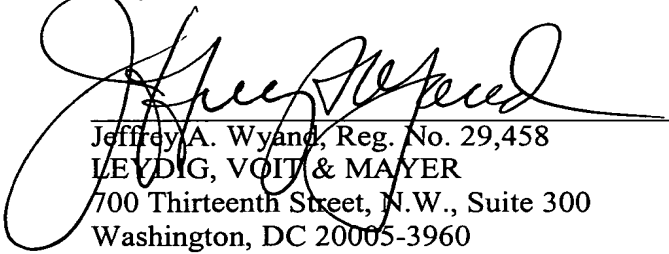
block and the nozzle provides the most effective arrangement in conducting heat away from and cooling the spray nozzle. Neither Li nor Zhao describe such a structure.

In the vaporizing device shown in Figure 2 of Li, the structure for cooling the nozzle 24 includes the cooling jacket 26 through which a coolant flows in order to cool the nozzle. It is apparent by inspecting Figure 2 of Li that there is no direct contact between this cooling structure and the nozzle 24. The unnumbered element, which seems to be attached to the end of the nozzle, is not part of the cooling block. That element, not described by Li, may be required to transmit the ultrasonic energy to the nozzle that produces the ultrasonic spray referred to in column 7, lines 1-3 of Li. The porous nature of that element suggests poor heat conductivity, further indicating that the element cannot be part of anything that could compare to the cooling block of claims 15-18. If there were such a role in Li, Li would have identified the element and explained its purpose.

Zhao expressly identifies a cooling element as cooling head 104. That cooling head includes a channel 134 through which a coolant is pumped, an analog of the cooling jacket 26 of Li. Zhao identifies the nozzle as element 144 and it is apparent that the cooling head 104 is remote in location from that nozzle 144. Thus, there can be no reasonable basis for asserting that there is any element in Zhao that could correspond to the cooling block of claims 15-18.

In summary, at least one element of each of claims 15-18 is missing from both of Li and Zhao. Therefore, no combination of those publications could begin to establish *prima facie* obviousness of any of those four claims. Upon reconsideration, the rejection of the claims should be withdrawn and all pending claims allowed.

Respectfully submitted,



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